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SHORT REPORT

Staged Hybrid Repairs of Acute Type A Aortic Dissection Involving the Right Aortic Arch with Retroesophageal Aortic Segment

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KEYWORDS
Right aortic arch;
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Abstract *Introduction:* Surgery for type A aortic dissection associated with right aortic arch is complicated because of the anatomical relationship of the aorta with the trachea and oesophagus.
Report: A 67-year-old man having right aortic arch with a retroesophageal aortic arch segment suffered an acute type A aortic dissection. An intimal tear located just proximal of the Kommerell's diverticulum. Total arch replacement and an elephant trunk insertion to cover the primary intimal tear were performed. Three months later, endovascular repair was carried out to close the primary intimal tear.
Discussion: Hybrid repair is the appropriate way for such an unapproachable case.

Introduction

Aortic dissection involving the right aortic arch (RAA) is rare and its surgical treatment depends on the anatomical relation of the aorta with the trachea and oesophagus. We describe a staged hybrid repair for acute type A aortic dissection with retrograde extension of the dissection into the ascending aorta.

Case Report

A 67-year-old man, who had an infrarenal abdominal aortic aneurysm (AAA), presented with sudden, severe, back pain. Enhanced computed tomography demonstrated acute type A aortic dissection associated with the anomalous aortic arch (Fig. 1). This type of anomaly was defined as RAA with a retroesophageal aortic arch segment.[1]

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Figure 1 The RAA deviated to the right cranial direction and curved to the left caudal direction behind the trachea and esophagus. The left common carotid (LCCA), right common carotid (RCCA), and right subclavian arteries (RSCA) branched from the ascending aorta in this order. On the left side of the esophagus, the left subclavian artery (LSCA) arose from a Kommerell's diverticulum. The dissection extended from the aortic root to the AAA with a patent false lumen.

Initially, we chose a median approach for emergency surgical treatment of acute type A aortic dissection. For the cardiopulmonary bypass, the right axillary and left common femoral arteries were cannulated and bicaval venous drainage was installed. The dissected ascending aorta was opened under 20 °C, and selective antegrade cerebral perfusion was established. The transverse intimal tear located just proximal to the Kommerell's diverticulum. However, as its complete resection with the Kommerell's diverticulum was too difficult, we inserted a 7-cm elephant trunk graft into the true lumen of the descending aorta to cover the intimal tear. The ascending to the arch aorta was replaced and the four branches were reconstructed. Three months later, after graft replacement of the AAA with double-barrelled proximal anastomosis, endovascular repair was carried out to close the primary intimal tear because the descending aorta enlarged to 58 mm (Fig. 2). One year later, the descending aorta remains at almost the same size (59 mm).

Discussion

Knight and Edwards[1] analysed 78 pathologic specimens that included the RAA and classified the RAA into five groups (Table 1). This case was defined as the RAA with a retroesophageal aortic segment.

According to a review article, aortic dissection reportedly occurred in 41% of the patients with an aberrant the left subclavian artery (LSCA) and an RAA.[2] Only 25 cases with aortic dissection involving the RAA have been reported. Of them, six had the retroesophageal aortic segment observed in the present case. All of those six suffered from type B aortic dissection. No type A dissection associated

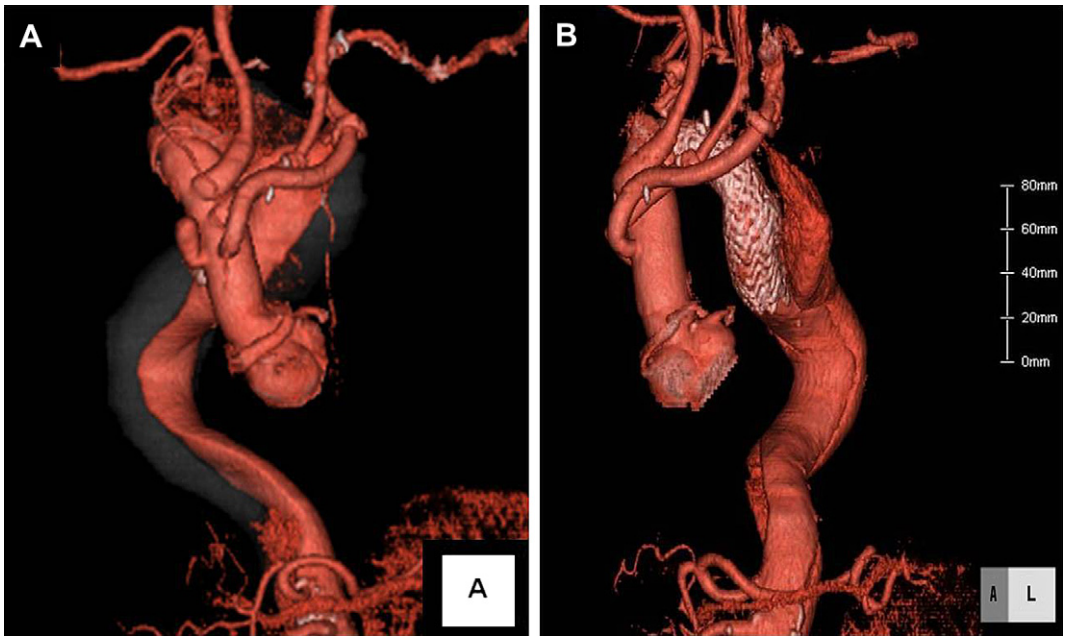

Figure 2 Three months after the first operation, the descending aorta was enlarged to 58 mm (A). Endovascular repair was carried out to close the primary intimal tear (B) after graft replacement of the AAA with double-barreled proximal anastomosis.

Table 1 Knight and Edwards[1] analyzed 78 pathologic specimens that included the RAA and classified the RAA into five groups.

1) RAA which was part of a double aortic arch (5%)
2) RAA with a retroesophageal aortic arch segment (4%)
3) RAA without a retroesophageal segment and mirror image branching (77%)
4) RAA without a retroesophageal segment and aberrant LSCA (13%)
5) RAA without a retroesophageal segment and isolated of LSCA (1%)

with RAA and retroesophageal aortic segment had been reported.

We first chose the median approach for emergency definitive repair of the dissecting ascending aorta to the proximal descending aorta, including resection of the primary intimal tear, with cerebral and cardiac safety. However, the intimal tear located around the Kommerell's diverticulum connecting with the retroesophageal aortic segment, which made the initially planned simultaneous resection of the intimal tear difficult. We thus changed the procedure to a staged repair combined with endografting. In the first stage, an elephant trunk was inserted into the true lumen to cover the primary intimal tear and avoid rupture by reducing the pressure inside the patent false lumen. In the second stage, we chose less invasive thoracic endografting to completely cover the intimal tear. The frozen elephant trunk technique might be an option.[3] However, a commercial device for frozen elephant trunk was unavailable in Japan.

At the closure of the entry with stent graft, we place the stent graft over the distal anastomosis of the arch graft to prevent the caudal migration.[4] For the spinal cord protection, the mean blood pressure was maintained above 90 mmHg. The cerebrospinal flood drainage was not performed due to the risk of bleeding due to the aspirin administration.

We, however, anticipate the further enlargement of descending aorta, and careful follow-up should be essential.

Conclusion

The staged hybrid repair consisting of emergency proximal aortic repair with subsequent endografting for the distal dissection is a useful option for such a rare and complicated case of acute type A aortic dissection associated with RAA and retroesophageal aortic segment.

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Conflict of Interest

None.

Funding

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